SET I.D.

DOE/OR/21548-352
CONTRACT NO. DE-AC05-86OR21548

SUPERCEDED

ENVIRONMENTAL QUALITY ASSURANCE PROJECT PLAN

Weldon Spring Site Remedial Action Project
Weldon Spring, Missouri

OCTOBER 1992 **REV. 0**

U.S. Department of Energy
Oak Ridge Operations Office
Weldon Spring Site Remedial Action Project

Printed in the United States of America. Available from the National Technical Information Service, NTIS, U.S. Department of Commerce, 5285 Port Royal Road, Springfield, Virginia 22161

NTIS Price Codes - Printed Copy: A03
Microfiche: A01

102292

MK-FERGUSON
A MORRISON KNUDSEN COMPANY

Weldon Spring Site Remedial Action Project
Contract No. DE-AC05-86OR21548

Rev. No. 0

PLAN TITLE: Environmental Quality Assurance Project Plan

APPROVALS

Steven Hinnefeld
Environmental Safety & Health Manager — Date: 10/22/92

Phil D. Coate
Quality Assurance Manager — Date: 10/22/92

Deputy Project Director — Date: 10/22/92

DOE/OR/21548-352

Weldon Spring Site Remedial Action Project

Environmental Quality Assurance Project Plan

Revision 0

October 1992

Prepared by

MK-FERGUSON COMPANY
and
JACOBS ENGINEERING GROUP
7295 Highway 94 South
St. Charles, Missouri 63304

for the

U.S. DEPARTMENT OF ENERGY
Oak Ridge Operations Office
Under Contract DE-AC05-86OR21548

TABLE OF CONTENTS

TABLE OF CONTENTS (Continued)

LIST OF FIGURES

LIST OF TABLES

MK-FERGUSON COMPANY
STATEMENT OF POLICY

MK-Ferguson Company, a division of Morrison Knudsen Corporation, is the Project Management Contractor (PMC) for the U.S. Department of Energy (DOE) at the Weldon Spring Site Remedial Action Project (WSSRAP). It is the goal of the PMC to perform all work activities in such manner that the required quality is attained or exceeded. The PMC's policy is for senior management to provide planning, organization, direction, control, and support to achieve the organizations's objectives; for the line organizational units to achieve quality; and for overall performance to be reviewed and evaluated using a rigorous assessment process (DOE 5700.6C, Sec.8).

To obtain these Quality Assurance (QA) objectives, the PMC has developed a formal *Environmental Quality Assurance Project Plan* (EQAPjP) described in this manual. The plan is tailored for the remediation of the Weldon Spring Site chemical plant and quarry and to meet the requirements of DOE Order 5700.6C and the guidance set forth in the QA Requirements and Description (QARD) produced by the DOE Office of Environmental Restoration and Waste Management. The EQAPjP is subordinate to the Quality Assurance Program and expands on specific EPA/QAMS-005/80 requirements.

As Project Director, I am committed to implementation of the WSSRAP PMC Quality Assurance Program. I have assigned to senior managers the responsibility and authority to implement, assess, and improve the program in their respective areas of control.

The corporate QA/QC manager has delegated to the Project Quality Manager the authority for developing and maintaining the WSSRAP PMC Quality Assurance Program, and for ensuring its effective implementation.

Compliance with the requirements of the WSSRAP PMC Quality Assurance Program is mandatory for all PMC personnel, and subcontractors are required to comply with all sections that apply to their activities.

Project Director

Deputy Project Director

Deputy Project Director

1 INTRODUCTION

The Weldon Spring Site Remedial Action Project (WSSRAP) *Quality Assurance Program Manual* (including subsequent remedial action activities) is written to meet the quality assurance program requirements of DOE Order 5700.6C. This *Environmental Quality Assurance Project Plan* (EQAPjP) is focused only on the U.S. Environmental Protection Agency (EPA) requirements under the Comprehensive Environmental Response, Compensation and Liability Act (CERCLA). This document replaces the existing *Environmental Quality Program Plan* that addresses the remedial investigation activities for the Weldon Spring quarry. It meets the applicable requirements of U.S. EPA's QAMS 005/80, *Interim Guidelines and Specifications for the Preparation of Quality Assurance Project Plans* (EPA 1980). The primary purpose of this document is to specify QA requirements for assessing the amount and extent of hazardous materials present on site and to support the WSSRAP Quality Assurance Program as required by the DOE.

The Quality Assurance Program Manual and the EQAPjP support quality affecting activities and implement environmental activities at the WSSRAP. The EQAPjP is supported by WSSRAP Standard Operating Procedures (SOPs), the WSSRAP Health and Safety Program, and work plans written for specific environmental tasks.

Quality Assurance for the environmental program detailed in this document and within the associated work plans is intended to be utilized by personnel conducting routine environmental monitoring and remedial investigation/feasibility studies (RI/FS) at the Weldon Spring site. Specific quality control procedures are detailed in WSSRAP Standard Operating Procedures and in specific remedial investigation and monitoring sampling plans. This program fulfills DOE requirements under the Federal Facilities Agreement between the DOE and the EPA for the Weldon Spring site.

The Quality Assurance Program and the EQAPjP address the 16 quality assurance elements (see Table 1.1) specified for environmentally related measurements by the EPA QAMS 005/80 (1980).

TABLE 1-1 Environmental Quality Assurance Program Plan Elements

QA Elements	Information Provided In
1. Title Page	EQAPjP[a]
2. Table of Contents	EQAPjP
3. Project Description	EQAPjP RI/FS
4. Project Organization and Responsibility	EQAPjP Quality Assurance Program Manual
5. Quality Assurance Objectives for Data Measurement	EQAPjP WSSRAP Sampling Plans WSSRAP Monitoring Plans Quality Assurance Program Manual
6. Sampling Procedures	EQAPjP SOPs[b]
7. Sampling and Document Custody	EQAPjP WSSRAP Sampling Plans SOPs Laboratory QA Procedures[c] WSSRAP Monitoring Plans
8. Calibration Procedures	EQAPjP SOPs Laboratory QA Procedures
9. Analytical Procedures	EQAPjP SOPs Laboratory SOPs
10. Data Validation, Verification, Reduction, and Reporting	EQAPjP WSSRAP Sampling Plans SOPs WSSRAP Monitoring Plans
11. Internal Quality Control	EQAPjP WSSRAP Sampling Plans SOPs Laboratory QA Procedures WSSRAP Monitoring Plans
12. Performance and System Audits	Quality Assurance Program Manual EQAPjP
13. Preventive Maintenance	EQAPjP SOPs Laboratory QA Procedures
14. Specific Routine Measures Used to Assess Data (Precision, Accuracy, and Completeness)	EQAPjP WSSRAP Sampling Plans SOPs WSSRAP Monitoring Plans Laboratory QA Procedures

TABLE 1-1 Environmental Quality Assurance Program Plan Elements (Continued)

QA Elements	Information Provided In
15. Corrective Action	Quality Assurance Program Manual EQAPP
16. Quality Assurance Reports to Management	EQAPP

[a] Environmental Quality Assurance Program Plan.
[b] SOPs: Standard Operating Procedures for WSSRAP.
[c] Individual Laboratory Quality Assurance Manuals.

2 PROJECT DESCRIPTION

2.1 Physical Setting

The Weldon Spring site is located in St. Charles County, Missouri, approximately 30 mi west of St. Louis. The site consists of an abandoned limestone quarry, a raffinate disposal area (raffinate pits), a former chemical plant, and various vicinity properties that are contaminated as a result of past Department of the Army (DA) and Atomic Energy Commission (AEC) activities at the site. During World War II, explosives were manufactured at the chemical plant. After the war, the plant was used to process uranium.

The contaminated soil, equipment, and buildings remaining on the chemical plant site require cleanup to meet current U.S. Department of Energy (DOE) guidelines for unrestricted use. The raffinate pits contain uranium and thorium residues. In addition, soil underlying the pits is probably contaminated and will require remedial action.

During the period 1943-1957, the DA utilized the quarry, which is about 4 mi from the site, for disposal of rubble and soils contaminated with trinitrotoluene (TNT) and dinitrotoluene (DNT). The AEC also later disposed of building rubble and soils contaminated with thorium, uranium, and their decay products in the quarry.

A detailed project description including site history, environmental setting, and a summary of the known and suspected nature and extent of existing contamination is presented in the *Work Plan for the Remedial Investigation/Feasibility Study - Environmental Impact Statement (RI/FS-EIS)* (ANL 1988).

2.2 Project Objectives

Environmental monitoring and characterization sampling activities are being undertaken to define the nature, extent, and magnitude of contamination at the site and surrounding area, and to determine the potential impact of these hazardous substances on public health and the environment. In addition, the data will assist in the formulation of strategies to develop and implement appropriate Interim Remedial Actions (IRAs) prior to the selection of final remedial actions.

Feasibility studies are being undertaken to assess and develop types of remedial and/or removal actions that should be considered. These actions must mitigate threats to, and provide protection for, public health and welfare and the environment. Additionally, an RI/FS-EIS report will be prepared that will address the technical and demographic issues and impacts associated with selecting viable and feasible remedial measures.

RI/FS activities are conducted by using the U.S. Environmental Protection Agency (EPA) Total Quality Management (TQM) phased approach, which implements the Data Quality Objective (DQO) process as detailed in Section 4.0.

2.3 Site Assessment

The National Contingency Plan, (40 CFR Part 300, Subpart F) sets forth the guidelines and requirements for assessment of a hazardous waste site (conducted under the Comprehensive Environmental Response, Compensation and Liability Act [CERCLA]) including response actions, preliminary site assessments and removal actions, site evaluation to determine whether the site should be included on the National Priorities List (NPL), and remedial actions. Included in the latter are requirements and criteria for conducting investigations and feasibility studies.

Environmental sampling activities for site characterization require sampling plans that summarize the existing data base and address the validity, sufficiency, and sensitivity of the data generated.

2.4 Hazardous Materials Handling

Materials that have been determined hazardous will be handled, stored, and shipped in accordance with the requirements of the EPA, the State of Missouri, U.S. Department of Transportation (DOT) requirements, DOE Orders, and Weldon Spring Site Remedial Action Project (WSSRAP) Compliance Procedures. Specific procedures and requirements for handling, shipping, and storage of hazardous waste and substances will be addressed in procedures and work plans approved by the WSSRAP Project Quality Manager.

3 PROJECT ORGANIZATION AND RESPONSIBILITIES

The U.S. Department of Energy (DOE) is responsible for conducting environmental monitoring and remedial actions at the Weldon Spring site that will place the site in a radiologically and chemically safe state in accordance with guidelines established by the DOE and the U.S. Environmental Protection Agency (EPA). The responsibility for management and technical direction of these environmental activities has been delegated to the DOE Oak Ridge Operation Office. MK-Ferguson is the Project Management Contractor (PMC) assisting the DOE in planning and managing remedial action activities. Headquartered in Cleveland, Ohio, MK-Ferguson is a wholly owned affiliate of Morrison Knudsen Corporation of Boise, Idaho. Joining MK-Ferguson as an integrated subcontractor is Jacobs Engineering Group, Inc. (JEG), headquartered in Pasadena, California. Project support is also provided by Argonne National Laboratories (ANL) in the development of environmental documents. ANL serves as an independent contractor reporting directly to the DOE.

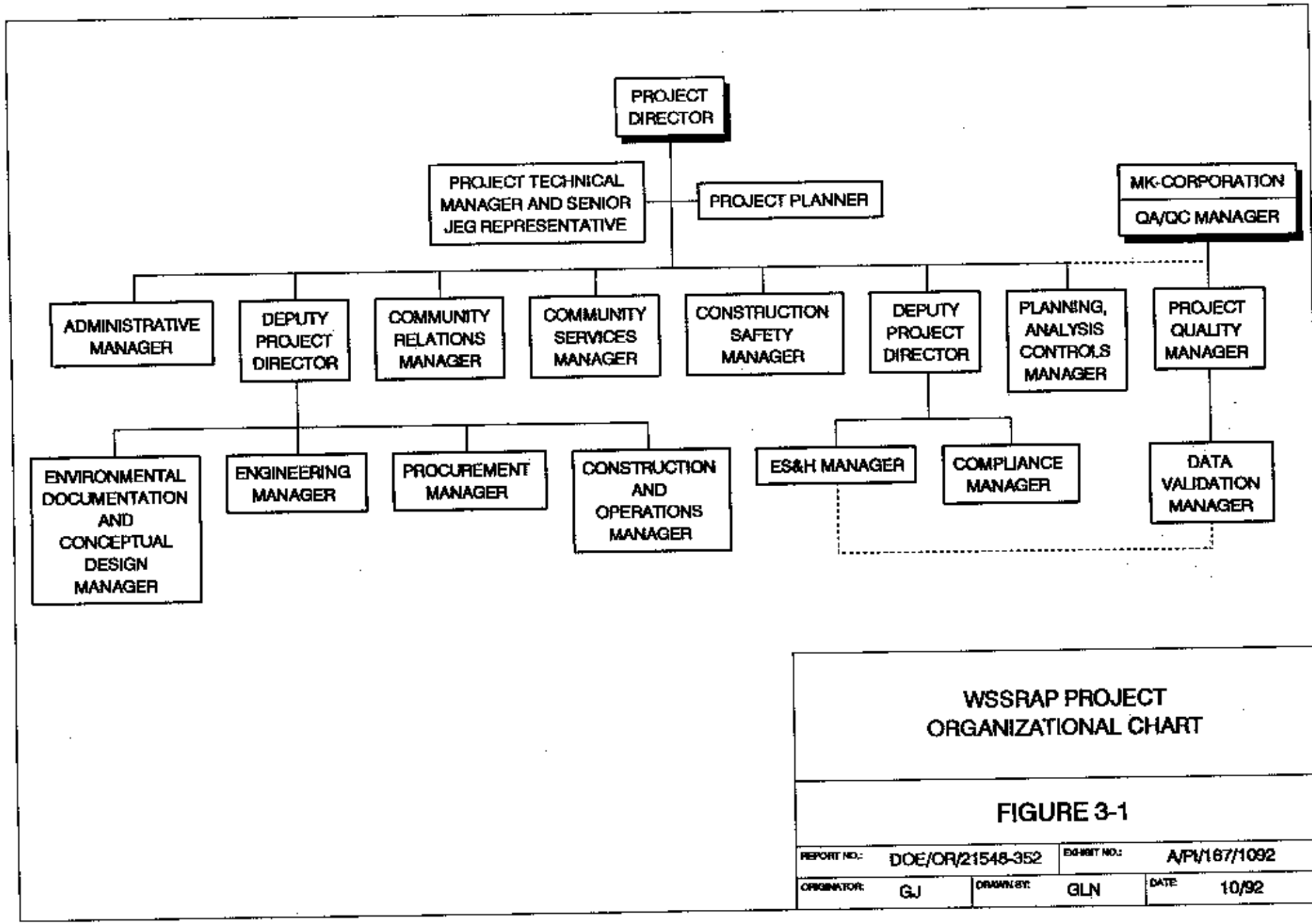
The *Remedial Investigation/Feasibility Study-Environmental Impact Statement (RI/FS-EIS) Work Plan for the Weldon Spring Site Remedial Action Project* (ANL 1988) describes the environmental compliance process and the role of the various organizations (including the PMC) under contract to the DOE for implementation of remedial activities at the Weldon Spring site. This document is updated by supplements to reflect developing remedial action strategies.

The PMC is responsible for all on-site activities including routine monitoring and site characterization programs in accordance with EPA requirements and DOE guidelines and orders.

The Project Organization Chart, Figure 3-1, shows the lines of authority, responsibilities, and communications assigned to key project entities.

Listed below are the reporting responsibilities and duties of key PMC personnel.

The Project Director reports to the DOE and to MK-Ferguson corporate management. He is responsible for the overall management of the Weldon Spring Site Remedial Action Project (WSSRAP). The Project Director's responsibilities include completion of all contract requirements within the approved schedule and budget and in accordance with applicable codes, standards, specifications, and the WSSRAP Quality Assurance Program.



WSSRAP PROJECT
ORGANIZATIONAL CHART

FIGURE 3-1

REPORT NO.:	DOE/OR/21548-352	EXHIBIT NO.:	A/PI/167/1092		
ORIGINATOR:	GJ	DRAWN BY:	GLN	DATE:	10/92

The Deputy Project Directors report to the Project Director and are responsible for aiding him in accomplishing project management and administrative duties. The Deputy Directors are authorized to act for the Project Director when the latter is absent from the project office.

The Administrative Manager reports to the Project Director and is responsible for all administrative matters, i.e., time-keeping, payroll, industrial relations, property control, and all matters concerning finance.

The Project Procurement Manager reports to a Deputy Project Director and is responsible for all procurement activity including the issuing and administration of subcontracts. Additional responsibilities include evaluation and analysis of bids and warehouse functions.

The Community Relations Manager reports to the Project Director and is responsible for interfaces with public groups and government agencies, arranging public presentations, and all news media relations.

The Planning Analysis and Control Manager reports to the Project Director and is responsible for the overall project management control system which includes the development of budgets and schedules, preparation of management reports and submittals, and review and analysis of progress.

The Compliance Manager reports to a Deputy Project Director and is responsible for waste management activities and for ensuring regulatory compliance. He is also the Federal Facilities Agreement coordinator for the WSSRAP.

The Engineering Manager reports to a Deputy Project Director and is responsible for directing and coordinating on- and off-site design activities. He provides engineering support to RI/FS, IRA, and EE/CA documents as well as site construction and remediation activities. He is also responsible for preparation, review, and approval of all WSSRAP engineering documents including design drawings and construction specifications.

The Environmental Safety and Health (ES&H) Manager reports to a Deputy Project Director. The ES&H Manager is responsible for industrial hygiene, radiological protection and environmental monitoring, radiological and chemical analysis interpretation and data verification, applied health physics, and all training required by these activities.

The Construction Management and Operations (CM&O) Manager reports to a Deputy Project Director. The CM&O Manager is responsible for construction management and coordination of all subcontractors, constructability reviews, and resolution of field problems. The CM&O Manager is additionally responsible for all construction operations and maintenance functions including existing facilities, new facilities, utilities, and equipment.

The Project Quality Manager reports to the Project Director on an administrative basis. Authoritatively, the Quality Manager reports off-site to the MK-Corporate QA Manager. The Quality Manager is responsible for development and implementation of the Quality Assurance Program. He has the authority to stop work or control further processing; identify the need for corrective actions; initiate, recommend, coordinate and/or provide solutions; and verify implementation of solutions and corrective actions related to the quality of the work.

The Environmental Documentation and Conceptual Design Manager reports to a Deputy Project Director and is responsible for preparation, review, control, and distribution of environmental documentation including the RI/FS and conceptual designs supporting remediation.

The Data Validation/Verification Supervisor reports functionally to the Environmental Protection Manager and administratively to the Project Quality Manager in order to ensure the independence necessary for this QA function. The Data Validation Supervisor is responsible for evaluation and application of qualifiers to radiological and chemical data and provides technical assistance pertaining to laboratory analyses and procedures.

The Communication Services Manager reports to the Project Director. He manages publications, document control, the Project Training and Improvement Program, Management Information Systems, project support, and the receptionist. These sections have a variety of responsibilities that affect everyday operation.

The Construction Safety Manager reports directly to the Project Director, and is responsible for the Construction Safety Program. He promotes safety awareness and ensures that accidents are properly investigated and reported on, and that action is taken to prevent recurrance.

4 QUALITY ASSURANCE OBJECTIVES FOR MEASUREMENT

The overall purpose of establishing quality assurance objectives for measurement data is to ensure that data of known and acceptable quality are provided for the intended data uses. These objectives apply to both existing and future sampling and field measurement data. Data reviewed or generated by the Weldon Spring Site Remedial Action Project (WSSRAP) are to be of such quality that they can be used as direct indicators of the nature and extent of radiological and chemical contamination at the Weldon Spring site.

These objectives are achieved through the implementation of standard operating procedures for the following:

- Document control.
- Field activities, including sample collection for routine monitoring and characterization.
- Chain of custody.
- Equipment calibration.
- Laboratory analyses.
- Data validation, verification, reduction, and reporting.
- Internal quality control checks.
- Audits and surveillances.
- Preventive maintenance.
- Corrective actions.
- Document hierarchy.

4.1 Data Quality Objectives

Environmental activities that support decisions, i.e., remedial investigations, risk assessments, and feasibility studies must be conducted by implementing the U.S. Environmental Protection Agency (EPA) Data Quality Objective (DQO) process (EPA 1987). The DQO process is a Total Quality Management approach to planning for data collection in support of environmental decision making. This planning tool utilizes seven key steps to ensure that decision makers and data collectors communicate effectively on how to address cleanup problems. The Project Management Contractor (PMC) recognizes that effective planning to implement the DQO process requires coordination with the ANL (an independent contractor to the DOE with responsibility for RI/FS work plans, risk assessments, feasibility studies, etc.) as

well as the DOE. The PMC will make every effort to facilitate the coordination through training, reporting, and task coordination. Key players involved in each step are also identified. These steps are defined in the following subsections. They are:

(1) Define the problem.
(2) Identify alternative actions that will resolve the problem.
(3) Identify inputs affecting the decision.
(4) Specify the domain of the decision.
(5) Develop a logic statement.
(6) Establish constraints on uncertainty.
(7) Optimize the design for collecting data

The DQO process is implemented in an iterative manner; each iteration helps to:

- Better define the scope of the problem.
- Focus the decision.
- Clarify courses of action and inputs needed.
- Establish go/no-go alternatives.
- Identify resources constraints.
- Describe consequences of incorrect decisions.

The initial iteration of the DQO process is qualitative in nature. Each subsequent iteration clarifies and quantifies each step of the process to develop defensible design criteria for data collection. The overall benefit of implementing the DQO process can be summarized as follows:

- Helps remedial project managers (RPMs) communicate effectively with data collectors by organizing key planning issues in a thoughtful sequence.

- Helps RPMs establish objective and quantitative criteria for knowing when to stop sampling.

- Helps ensure that investigations will produce the types and amounts of data the RPMs need to decide which course of action to take, with acceptable and pre-specified measures of risks of incorrect decisions.

- Reduces overall time for investigations by decreasing the likelihood of false starts and minimizing rework.

The DQO process is implemented within all activities that support environmental decision making (i.e., RI/FS, risk assessment, site closure). Implementation is described in the *Environmental Data Administration Plan* (EDAP) (MKF and JEG 1992a). The individual sampling plans present Stage I and Stage II reports for decision making and the optimum design criteria for data collection.

Step 1: Define the Problem

The problem is defined in terms of what is known about or expected to be discovered in the effected area. This may include exposure pathways, types of contaminants, and changes to the site since original activities.

Step 2: Identify Alternative Actions to Resolve the Problem

The product of this step is a list of alternative courses of action that address the problem. Courses of action may include:

- Study the site of contamination further and develop remedial alternatives.
- Recommend "no action" based on information available.
- Recommend corrective action, such as an emergency response action, based on information indicating an immediate threat to public health.

Step 3: Identify Inputs Affecting the Decision

This step generates a list of questions that must be answered to decide which action to take, how criteria for decision making will be established, and the relevance of social and political factors.

Step 4: Specify Domain of Decision

Spatial and temporal boundaries are defined in this step to address the area and time frame required to collect data to determine the smallest area to which a separate decision will apply.

Step 5: Develop a Logic Statement

An "if/then" statement is developed from knowledge summarized in the previous DQO steps. This statment explains what actions will be taken under what circumstances.

Step 6: Establish Constraints on Uncertainty

Quantitative and qualitative statements concerning the level of uncertainty that will be allowed in the data to implement the logic statement are addressed in this step. The consequences of incorrect decisions are determined to evaluate the risk involved.

Step 7: Optimize Design for Obtaining Data

In this step a statistical approach is used to design a sampling program that will achieve the desired constraints on uncertainty.

4.2 Document Control

The goal of the Weldon Spring site document control system is to ensure that pertinent documents, including drawings, procedures, and specifications, used by WSSRAP personnel are current. To achieve this goal, procedures for identifying and controlling quality-affecting documents have been developed. These procedures include establishment of a numbered document control system and a document inventory procedure. The WSSRAP *Engineering Document Control Procedure* implements this system.

The document control system ensures that originals and copies of documents are kept secure and under custody, when necessary, and that individuals holding documents receive revisions and updates when appropriate.

4.2.1 Controlled Documents

Controlled documents are documents issued by authorized personnel which, in accordance with requirements of WSSRAP standard operating procedures, are assigned unique identifying numbers and logged out to specific individuals. These documents specify quality requirements for activities affecting quality. A distribution list for each document is maintained in the Document Control Center. These documents include:

- QA/QC plans.
- Procurement plans.
- Engineering design documents.
- Design procedures.
- Standard operating procedures.
- Safety plans.
- Plans and procedures required by regulation.

4.2.2 Document Ownership and Distribution

All quantitative project documents generated by the WSSRAP are the property of the U.S. Department of Energy (DOE). Such documents are distributed to State agencies, Federal agencies, other regulatory agencies, and citizen's groups in accordance with DOE approvals, policies, and guidelines. Distribution of information and documents to third parties is with concurrence of, or at the direction of, the DOE. Controlled documents, i.e., manuals, procedures, instructions and guidelines, are distributed on the basis of a written, approved standard distribution list. Controlled documents distributed to parties are inventoried and are accompanied by a document transmittal form. A return receipt is required and documented on the controlled document transmittal log. All quality affecting documents submitted to the DOE are reviewed and approved by the Project Management Contractor (PMC) in accordance with WSSRAP standard operating procedures.

5 SAMPLING AND ANALYTICAL PROCEDURES

The objective of field sampling and laboratory analytical procedures is to obtain defensible data that meet data quality requirements for precision, accuracy, representativeness, comparability, and completeness (PARCC) as required by characterization and monitoring sampling plans which utilize the data quality objective process for data collection.

5.1 Field Sampling

Precision, comparability, representativeness, and completeness for field sampling activities at the Weldon Spring Site Remedial Action Project (WSSRAP) are controlled and directed by approved standard operating procedures (SOPs) and sampling plans. All SOPs and sampling plans are reviewed, approved, and controlled by appropriate WSSRAP procedures. Field sampling SOPs are developed to standardize, where possible, sampling procedures to ensure that samples are comparable to, and compatible with, other data collection activities at the WSSRAP. Sampling is conducted by trained individuals. Training of individuals is documented according to WSSRAP training requirements before any individual conducts or assists with sampling activities.

The WSSRAP SOPs include descriptions of:

- Reference of sample methods.
- Sample collection techniques.
- Sample identification.
- Sample preservation.
- Sample packaging and handling.
- Sampling quality control procedures.
- Quality assurance records.
- Equipment calibration and maintenance.

The WSSRAP has developed an *Environmental Data Administration Plan* (EDAP) (MKF and JEG 1992a) to manage the use of environmental data. The EDAP directs the implementation of the data quality objective process for the sampling plans where appropriate.

Field sampling plans establish the quality control criteria necessary to meet the sampling precision, representativeness, comparability, and completeness required to support the data quality objective process as defined in the EDAP.

Field sampling activities that produce data (i.e., log books, field data sheets, equipment calibration records) become Quality Assurance (QA) records and are maintained in accordance with the Quality Assurance Program.

5.2 Analytical Procedures

All quantitative laboratories conducting radiological and chemical analysis for the WSSRAP are required to submit controlled copies of site specific Quality Assurance Project Plans (QAPjPs) and SOPs to be reviewed and accepted by the Project Management Contractor (PMC). The WSSRAP and contract laboratory SOPs direct operations, analyses, and activities which are thoroughly prescribed, documented, and performed in accordance with accepted standards and methodologies. Any changes to controlled SOPs and QAPjPs must be approved by the PMC. Laboratory QAPjPs and SOPs specify quality control requirements to demonstrate the precision and accuracy of methods and procedures.

All data generated by analytical activities (i.e., calculations, chromatographs, calibration curves, QC analyses) that are received by the WSSRAP are QA records and are maintained in accordance with the Quality Assurance Program.

Maintenance and storage of completed records, charts, and logs of all pertinent calibrations, analyses, QC activities, and data generated by contract laboratories are kept in a WSSRAP-specific project file. Both electronic and hardcopy data reports must be available at contract laboratorys' facilities for three years after termination or expiration of any contract. Storage areas must keep records safe from damage by moisture or fire.

Routine audits and surveillances are conducted by the Project Quality Department on all contract laboratories to verify their conformance to their QA programs, WSSRAP contract specifications, and appropriate regulatory requirements.

6 CALIBRATION AND PREVENTIVE MAINTENANCE

To help achieve the necessary data quality, calibration and preventive maintenance procedures control field sampling equipment and laboratory instruments.

6.1 Field Sampling Equipment

To ensure the precision, accuracy, and minimal down time of field sampling equipment, the Weldon Spring Site Remedial Action Project (WSSRAP) develops Standard Operating Procedures (SOPs) for operation, calibration, and maintenance of all site field sampling equipment.

These SOPs include means for demonstrating and documenting instrument precision and accuracy. Such means are:

- All measurement devices must be assigned individual identification numbers. Documentation must identify the function, calibration requirements, operating technicians, and standards used for calibration of each device.

- Each measuring device must be calibrated against a traceable standard of known accuracy.

- Sampling and analytical calibration methodologies must be documented and referenced to Federal and regulatory standards.

The SOPs also identify the type and frequency of routine preventive maintenance required for each model of field equipment used. Equipment must be maintained at least in accordance with manufacturers' recommendations. Logbooks must be maintained for each field sampling instrument. These logs must document maintenance performed, technician performing maintenance, and whether maintenance was routine or for repair.

Prior to operating field sampling equipment, personnel must be trained in its operation. Documentation of training is in accordance with WSSRAP SOP training procedures. Only trained qualified technicians perform preventive maintenance.

All records of calibration and maintenance are Quality Assurance (QA) records and are maintained in accordance with quality assurance procedure SQP-7, *Quality Assurance Records*.

6.2 Laboratory Instruments

All laboratories conducting radiological and chemical analyses for the WSSRAP must include in their site-specific quality assurance project plans (QAPjPs), calibration and preventative maintenance requirements for all instruments used to conduct WSSRAP analyses. For each model of instrument the QAPjPs must identify:

- Calibration requirements.
- Calibration acceptance criteria.
- Corrective action if required.
- Routine maintenance requirements.

Laboratories must, upon request, provide to the WSSRAP documentation for all calibration, maintenance, and corrective actions required. Calibration and maintenance documents are QA records and are maintained in accordance with quality assurance procedure SQP-7, *Quality Assurance Records*.

7 SAMPLE CUSTODY

A major required component of all field investigation sampling plans is maintaining sample integrity from collection to data reporting. To maintain and document sample possession, chain-of-custody procedures must be implemented. Elements of the chain may include at a minimum:

- Sample seals.
- Labels with identification numbers to allow for sample tracking.
- Field log books.
- Field data record forms.
- Chain-of-custody records.
- Sample analysis request sheets.
- Bills of lading and air bills.
- Field and laboratory tracking forms.

Field and laboratory sample custodians or their designated representatives are responsible for maintaining custody of samples. A sample is considered to be under a person's custody if one or more of the following conditions are met:

- It is in the person's physical possession.
- It is in view of the person.
- It is secured by the person so that no one can tamper with the sample without being detected.
- It is secured by the person in an area that is restricted to authorized personnel.

Sample custody is divided into the following three parts:

(1) Field sample custody.
(2) Laboratory sample custody.
(3) QA record.

7.1 Field Sample Custody

Sampling procedures for groundwater, soil, waste, etc., are addressed in the Weldon Spring Site Remedial Action Project (WSSRAP) Standard Operating Procedures (SOPs) and sampling plans. The sample custody program for the Weldon Spring site includes documentation of procedures for the preservation of samples, sample identification, recording sample collection locations, and specific considerations associated with sample acquisition. Applicable forms for recording these data, and the tracking of samples as required by chain-of-custody procedures, are specified in SOPs. The chain of custody requires at a minimum, the following:

- Sample identification.
- Sample location.
- Sample date.
- Sample matrix.
- Sample preservation.
- Analysis required.
- Release and acceptance information, i.e., date, location, technician's signature.

In situ or field measurements, e.g., pH measurements, temperature, conductivity, flow measurements, and air monitoring data are recorded in field log books or on field data record forms. Sample containers are labeled or tagged appropriately according to applicable SOPs. Labels or tags contain the following information:

- Organization name.
- Location.
- Date.
- Matrix type.
- Preservation.
- Sample ID No.
- Name(s) of sampler(s).

Samples are accompanied by chain-of-custody records. Completed chain-of-custody documents are retained as Quality Assurance (QA) records and maintained in accordance with the Quality Assurance Program.

7.2 Laboratory Sample Custody

Samples are packaged and shipped to the laboratory in accordance with U.S. Department of Transportation requirements, the *Site Consolidation Transportation Activity Manual*, (MKF and JEG 1992b) and WSSRAP procedures with a separate custody record accompanying each shipment. Authorized sample custodians at the laboratories sign for incoming field samples, obtain documents of shipment, and verify data entered onto the sample custody records. The laboratories are required to inform the PMC of receipt of samples within one working day. If any damage or shipping discrepancy is noted upon receipt of samples, the laboratories are required to inform the PMC immediately. Contract laboratories are required to maintain custody of samples as defined in Section 7.0.

8 DATA EVALUATION, REDUCTION, AND REPORTING

Statistical parameters are used to assess the quality of data obtained. Section 4.1 discusses the process used to establish and assess the precision, accuracy, representativeness, completeness, and comparability (PARCC) of Weldon Spring Site Remedial Action Project (WSSRAP) environmental monitoring and measurement data. This section discusses criteria to be used in handling collected data.

8.1 Data Packages

Data packages received from contract laboratories undergo several processes to evaluate the quality of the data. When the data are first received, copies are distributed to the Quality Assurance (QA) Department for storage as QA records, the Verification Group and data users for review. If validation of sample analysis has been requested, a copy is forwarded to the Validation Group for data qualification. The following subsections further describe the evaluation process.

8.1.1 Data Verification

The WSSRAP processes all data received from contract laboratories in accordance with ES&H 4.9.1a/2, *Environmental Monitoring Data Verification.* The following factors are reviewed to verify if a sample has been properly handled according to WSSRAP protocol:

- Chain of custody.
- Holding times.
- Sample preservation requirements.
- Laboratory chain of custody.
- Sample analysis request form.
- Quality Control (QC) samples.
- Laboratory receipt forms.

8.1.2 Data Review

Copies of the data packages are distributed to the data users for their review. The data are reviewed to identify discrepancies in the field Quality Control samples, inconsistencies of

the data in comparison to historical data, or apparent abnormalities. Deficiencies reported by data users are reported to the verification group. Data uses may request validation of any data that appear to be of questionable quality.

8.1.3 Data Validation

Randomly selected laboratory data, and data selected by verification or data users undergo thorough reviews of the analytical process in accordance with WSSRAP data validation SOPs. These reviews are conducted by the validation group.

The purpose of the validation procedure is to specify a consistent means for reviewing and evaluating the data resulting from laboratory analyses and for providing a consistent means for documenting the evaluation, and reporting the usefulness, of the data to the data users. This is accomplished through a thorough review of the analytical data utilizing laboratory analytical records to assess laboratory conformance to quality control criteria, data quality requirements for data quality objectives, and procedural requirements.

8.2 Data Reduction

A data reduction process has been developed for all data collected on site for the WSSRAP. Generally, these procedures are described in WSSRAP Standard Operating Procedures (SOPs).

8.2.1 Computerized Data Reduction

A large amount of data will be generated during site characterization. Those data collected and analyzed during the sampling and analysis program will be reduced for input into the computerized data base. These data may include logs, tracking forms, and results of laboratory analyses. Computer software will be managed in accordance with SQP-13a, *Computer Software Quality Assurance Qualifications*.

8.3 Reporting

Documentation of the data collection and analysis process is an integral part of the quality assurance/quality control (QA/QC) program. Data validation techniques require that standard

operating procedures, sample tracking methods, validation procedures, QC checks on PARCC criteria, and all sampling and laboratory activities be documented. Data obtained from sample collection and analysis operations are recorded on standardized report forms or log books.

These documents include approved WSSRAP forms. Some of these documents are listed below:

- CLP report forms.
- Chain-of-custody forms.
- Sample labels.
- Sample analysis request forms.
- PARCC objectives summary forms.
- QA/QC report forms for laboratory.
- Equipment calibration report forms.
- Standard field and laboratory log forms.

8.3.1 Field and Laboratory Quality Assurance Records

Documents used to record environmental activities are, where practicable, numbered and assigned to individuals designated to perform specific tasks. They include:

- Field log books.
- Field data record forms, e.g., well inventory forms, pumping test data sheets.
- Analytical log books.
- Laboratory data, calculations, graphs, etc.
- Location maps, photos, selected drawings, as-builts.
- Checklists of equipment performance.
- Equipment maintenance logs including repair and calibration information.
- Photographic logs.
- Engineering calculations.

8.3.2 Quality Assurance Record Storage

QA records are monitored as specified in SQP-7, *Quality Assurance Records* and are stored in locked and secure facilities. Dual document storage facilities are maintained at

locations sufficiently remote from each other to eliminate the chance of simultaneous exposure to a hazard. Access to both facilities is controlled. This applies to both computer generated data and hard copy documents. Copy-protected software is replaceable from the supplier.

Documents are reviewed for technical adequacy by the responsible management before submittal to the Project Quality Department for retention as QA records. QA records are one of-a-kind documents not being retained by the Document Control Center in the project correspondence or controlled document system. Appropriate documents become QA records upon completion of the document.

9 INTERNAL QUALITY CONTROL

To achieve the highest practical attainable level of precision and accuracy, sampling programs at the Weldon Spring Site Remedial Action Project (WSSRAP) include the use of Quality Control (QC) samples to measure field and laboratory performance. QC samples are submitted to laboratories as blind samples. To provide quality control information, the following types of QC samples may be utilized:

- Background Samples: The samples are obtained from media characteristic of the site but outside of the zone of contamination, e.g., groundwater samples collected from the upper Burlington-Keokuk aquifer upgradient of the Weldon Spring Chemical Plant area.

- Duplicate Samples: These samples are collected at the same time from common collection manifolds, locations, or sampling divides, or as split samples from one sampling event, and sent to the same laboratory to verify sampling and inter-laboratory precision. Generally, one out of every 20 investigative samples is replicated.

- Split Samples: Replicate samples, divided into two portions, are sent to different laboratories to assess inter-laboratory precision.

- Rinse Blanks: Analyte-free deionized water is used to rinse sampling equipment that has been decontaminated, e.g., bailers, pumps, augers, split tube samplers, etc. When using non-dedicated sampling equipment, one rinsate sample is collected per day or for every 20 investigative samples, whichever is greater. Upon analysis, these samples are used to assess the adequacy of the field decontamination process.

- Trip Blank: Analyte-free water taken from a laboratory to the sampling site and returned to the laboratory unopened. Trip blanks are used only when sampling for volatile organics.

- Performance Audit Sample: A sample containing known concentrations of analytes which is submitted to a laboratory without warning to assess its performance. See Section 10.3.

Internal quality control samples at the laboratories include the utilization of matrix spikes and laboratory control samples, including U.S. Environmental Protection Agency (EPA) quality control ampules, Standard Reference Materials (SRMs), and laboratory-prepared solutions made from pure compounds and method or analytical blanks.

The laboratories selected by the WSSRAP utilize the standards and guidelines prescribed by the EPA, where appropriate, for analyzing relevant chemical and radiological constituents.

The analytical internal quality control operations presented in *Users Guide to the Contract Laboratory Program* (EPA 1986b) are applied to contract laboratories performing analyses on samples generated by the WSSRAP. These operations include:

- Inductively Coupled Argon Plasma (ICP) Interference Check Sample Analysis: Performed at least twice per eight-hour shift, to verify inter-element and background correction factors.

- Preparation Blank Analysis: Performed on each batch of samples or on each set of 20 samples, to ascertain whether sample concentrations reflect contamination.

- Spiked Sample Analysis and Duplicate Sample Analysis: Performed on each concentration and matrix within each set of 20 samples of a similar matrix to provide information concerning sample homogeneity, analytical precision and accuracy, the effect of the sample matrix on the analytical methodology, and to allow for evaluation of the long-term precision of the method.

- ICP Serial Dilution Analysis: Performed on each 20 samples received in each group of samples of a similar matrix type and concentration to ascertain whether significant chemical or physical interferences exist due to sample matrix.

- Furnace Atomic Absorption Quality Assurance (QA) Analysis: Required for quantification; incorporates duplicate injections and analytical spikes in order to evaluate the precision and accuracy of the individual analytical determinations on each sample.

- Laboratory Control Spikes (LCS): Standards carried through sample preparation and analysis procedures to document the performance of the entire analytical process. The results on analysis of LCS are submitted with the data package. Laboratories verify on a quarterly basis their instrument detection limits, ICP linear ranges, ICP inter-element correction factors, and ICP integration times.

It is the responsibility of each laboratory to document in each data package submitted that both initial and ongoing instrument and analytical QC requirements have been met. Any samples that have not been analyzed according to contract QC requirements are re-analyzed by the laboratory or properly qualified by the Validation Group.

10 AUDITS AND CORRECTIVE ACTIONS

Quality assurance objectives for the Weldon Spring Site Remedial Action Project (WSSRAP) will be met in part by audits of field sampling and laboratory analysis activities. The goals or objectives of the Weldon Spring site characterization Quality Assurance/Quality Control (QA/QC) audit program are to ensure that:

- QA/QC requirements are clearly established.
- All sampling and analytical efforts are described by an approved sampling plan.
- Standard operating procedures are developed for each measurement activity.
- Qualified personnel are assigned to perform these activities in accordance with the procedures.
- Proper documentation is prepared to establish data validity.
- Audits are performed to determine compliance with the established QA/QC requirements.
- Corrective actions are proposed and implemented to address deficiencies identified during audits.

This section describes the performance, reporting, and documentation phases of the audit portion of the WSSRAP Quality Assurance Program.

10.1 Audits—General

An audit program is implemented to ensure compliance with the QA/QC program requirements established for the WSSRAP in the approved *Project Management Contractor Quality Assurance Program* (MKF and JEG 1992c). This mechanism is intended to assess systems and procedure effectiveness.

Audits:

- Identify weaknesses and strengths of overall programs.
- Dictate corrective actions as required.
- Allow for modifications and enhancement of QA/QC programs.
- Serve as a vehicle for providing necessary technical assistance.
- Measure the effectiveness of QA/QC programs to ensure quality of data.

Audits at the WSSRAP include performance and systems audits. These audits are performed both internally and externally to the Project Management Contractor (PMC). All audits are performed by PMC personnel that have been trained in accordance with SQP-15, *Auditor Training and Lead Auditor Certification*.

Systems audits consist of an evaluation of all components of a measurement system to determine their capability, proper selection, and use. A systems audit includes a careful evaluation of field and/or laboratory quality assurance/quality control programs. Systems audits are normally performed prior to, or shortly after, systems are operational; however, such audits are performed on a regularly scheduled basis for the duration of the WSSRAP. Systems audits are performed in accordance with SQP-23, *Independent Assessment*.

10.2 Audit Preparation

Audits are performed under the direction of certified lead auditors who are assisted by certified auditors and/or appropriately trained technical specialists as required to audit all components of the WSSRAP QA/QC programs. For each audit, the lead auditor is responsible for preparing and maintaining an audit schedule, reviewing and documenting the qualifications on all audit personnel including technical specialists, providing notifications to audited organizations, and preparing and/or approving audit plans and checklists.

The lead auditor, after a review of applicable requirements, such as procedures, contracts, plans, standards, and project schedules, prepares an audit schedule indicating the organization to be audited, subjects to be audited, and schedule of the audits. The audit schedule is reviewed periodically and revised as necessary to ensure that coverage is kept current. In advance of the scheduled audit, the lead auditor notifies the organization to be audited of the proposed schedule and scope of the audit.

The lead auditor selects the audit team members including auditors, technical specialists, and observers as required to best perform a comprehensive audit of the systems or components to be audited. Team personnel are appropriately trained and do not have direct responsibilities in the areas being audited. The lead auditor documents the qualifications of the audit team members.

The lead auditor is responsible for preparation of a written audit plan as requested by the Project Quality Manager. The audit plan includes:

- Audit number.
- Organization to be audited.
- Subjects to be audited.
- Scope of the audit.
- Projects or activities to be audited.
- Audit team members.
- Audit schedule.
- Applicable documents.

The audit plan is used to provide the audited organization's management with the proposed scope, requirements, personnel, and schedule for the audit.

The audit team prepares audit checklists based on their review of applicable or relevant and appropriate requirements, documents, including procedures; standards, contracts, and plans; and previous audits, if any, of the systems or tasks to be audited. The lead auditor is responsible for review and approval of the audit checklists. These checklists are used to evaluate the performance of the audited activity.

The lead auditor provides the audit team with the audit plan and checklists, and orients the team to the schedule for the audit and the internal and external organization and contractual interfaces and responsibilities of the organization to be audited.

Audits are scheduled at intervals consistent with the schedule for accomplishing the activity and commensurate with the status and importance of the activity.

Audits are performed in accordance with written procedures.

Audit results are documented by auditing personnel and reviewed by management having responsibility in the area audited.

10.3 Performance Audits

Performance audits are conducted periodically to determine the accuracy of total measurement systems or components thereof. Contract laboratories participate in the performance audit program in accordance with QA performance audit standard operating procedures (SOPs).

10.4 System Audit Performance

In each audit, the lead auditor conducts a pre-audit meeting at the audit site with the audit team and responsible management of the organization to be audited. The pre-audit meeting provides a means to introduce the audit team; establish contacts and interfaces; present and confirm the audit plan, scope, and sequence; and schedule the post-audit meeting.

The audit is conducted following the approved audit checklist as a guideline. The lead auditor may assign portions of the checklist to members of the audit team commensurate with their expertise. The checklist is a guideline; responsible questioning or investigation may lead the audit into areas not described in the audit plan or by the audit checklist.

Audits include objective examination of work areas, activities, processes, and items and review of documents, records, quality-related practices, procedures, and instructions to determine compliance with the QA/QC program requirements and the project procedures manual. The results of the investigations are recorded on the audit checklists.

Discrepancies or concerns discovered during the course of the audit are presented to the lead auditor for review and discussion prior to formalizing. Discrepancies are categorized as follows:

1. Finding: A defiency or non-compliance to established procedures, requirements, or regulations.

2. Item of Concern: A condition or item identified during an assessment which, although currently meeting established requirements, may if left without management attention, lead to a departure from established requirements.

3. Observation: A conclusion which is the result of a generally subjective evaluation of implementation practices or management systems related to the area under review.

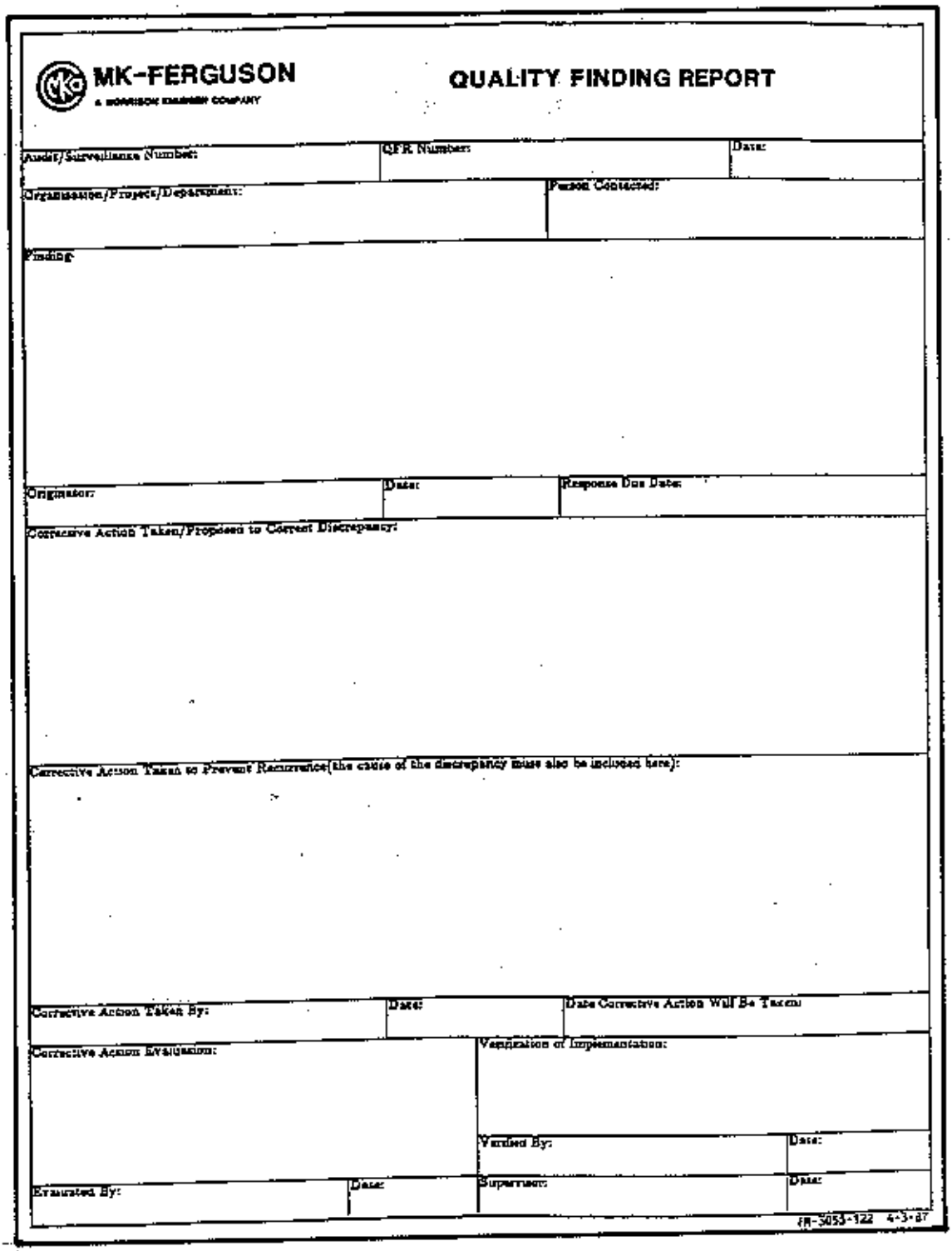
At the conclusion of the audit, a post-audit meeting chaired by the lead auditor is conducted. The purpose of the post-audit meeting is to present the findings, items of concern, and observations to the responsible management of the audited organization. Resolution of discrepancies and commitments for corrective actions, including a tentative schedule for completion of corrective actions, are discussed at this time.

10.5 Audit Reporting

Audit reports are submitted to cognizant managers by either the Project Quality Manager or the lead auditor. These reports address the performance of measurement systems and data quality. Audit reports include the dates of audits, audit procedures, names of auditors, audited organization participants, specific procedures audited, a summary of audit results including findings and observations (if any), and recommendations for correcting deficiencies or improving the QA/QC programs, if necessary.

Audit findings are recorded on an Internal Quality Audit Finding Report Form and are included as part of the audit report.

Audit reports are issued promptly upon completion of an audit (with 30 days), and include the date required for response to audit findings. Findings require responses within 30 days. Responses must include commitment dates for completion of corrective actions to be taken, results of a review for potential impact on other items or activities (if any), and the causes of deficiencies.



MK-FERGUSON
A MORRISON KNUDSEN COMPANY

QUALITY FINDING REPORT

Audit/Surveillance Number:	QFR Number:	Date:
Organization/Project/Department:	Person Contacted:	
Finding:		
Originator:	Date:	Response Due Date:
Corrective Action Taken/Proposed to Correct Discrepancy:		
Corrective Action Taken to Prevent Recurrence(the cause of the discrepancy must also be included here):		
Corrective Action Taken By:	Date:	Date Corrective Action Will Be Taken:
Corrective Action Evaluation:	Verification of Implementation:	
	Verified By:	Date:
Evaluated By:	Date:	Supervisor: Date:

FR-3053-122 4-3-87

QUALITY FINDING REPORT FORM

FIGURE 10-1

REPORT NO.: DOE/OR/21648-362	EXHIBIT NO.: A/PI/245/1191	
ORIGINATOR: GJ	DRAWN BY: GLN	DATE: 11/91

Observations may or may not require formal responses depending upon the severity, type, and number of specific deficiencies. The lead auditor specifies which of the observations require written responses. Observations are recorded in the body of the audit report.

Completion of corrective actions noted in audit responses are verified upon receipt of the responses or by the dates specified on the responses.

10.6 Surveillance

In addition to regularly scheduled audits, the QA Department performs surveillances of field and laboratory activities in accordance with SQP 2a, *Quality Assurance Surveillance Procedure*. Surveillance is the act of monitoring or observing to verify whether an item or activity conforms to specified requirements.

Surveillances may be planned or unplanned, scheduled or unscheduled. No checklist is required; however, the approved procedure for the operation or task is followed to ensure adherence to the requirements. Surveillances are documented by the individuals performing them and reviewed by the lead auditor.

When deficiencies are noted, the responsible departments are notified via Quality Finding Reports (QFRs).

Responses to QFRs must be returned to the Project Quality Department by the responsible department manager and appropriate follow-up actions must be prescribed at that time.

10.7 Finding/Deficiency Corrective Action and Closure

The lead auditor is responsible for the evaluation of corrective action responses to determine if the corrective action for each finding/deficiency is adequate, has been scheduled, or has been completed. The lead auditor ensures that responses to findings written by audit team members fully address discrepancies.

Follow-up may be accomplished through written communication, re-audit, surveillance, or other appropriate means. Unsatisfactory responses are addressed in writing, indicating why

they are unsatisfactory, and specifying a reply due date. Findings and deficiencies are considered open until approved corrective actions have been completed. The lead auditor is responsible for closing all findings and deficiencies.

10.8 Quality Assurance Records

All audit plans, correspondence relating to audits/surveillances, audit findings, audit reports, individual certifications, QFRs and surveillance reports become QA records and are maintained in accordance with the WSSRAP *Quality Assurance Program* (MKF and JEG 1992c).

11 QUALITY ASSURANCE REPORTS TO MANAGEMENT

11.1 Assessment of PARCC

The Validation Department generates periodic and quarterly reports to managements. The appropriate Validation SOPs clearly define the mechanism for transmittal of these reports.

11.1.1 Periodic Reports

Reports generated by the Validation Department from random selection or data user requests, are submitted to management upon completion. These periodic reports are submitted to the manager of the applicable department for their information.

11.1.2 Quarterly Reports

The Validation Department reports to management all data assessments to date on a quarterly basis. These reports are submitted as a minimum to the following:

- The Deputy Project Director
- The Quality Assurance Department
- Environmental Safety and Health Manager

11.2 Quality Assurance Reports

Quality Assurance (QA) Department's Standard Quality Procedures define the disposition of all reports, generated by QA activities, to the appropriate management levels.

The QA Department has developed a Site Wide Audit Tracking System (SWATS) to identify, track, and document closure of quality effecting deficiencies. The SWATS has been divided into three categories:

- Extrinsic SWATS - deficiencies that have been identified and issued to the WSSRAP from an outside source (i.e., DOE, PMC corporate office).

- Internal/Subcontractor SWATS - deficiencies that were identified by Quality Assurance surveillances, inspections, and audits.

- Self Assessment SWATS - deficiencies identified by the specific department conducting a self assessment.

11.2.1 Monthly Reports

- QA monthly reports will be submitted to the M-K corporate QA Manager.

- Monthly SWATS reports will be submitted to PMC Management to identify open deficiencies.

11.2.2 Quarterly Reports

- Quarterly Quality Reports will be submitted to the DOE Project Office summarizing quality activities.

- Quarterly Extrinsic SWATS Reports will be submitted to the DOE project office for closure of externally identified deficiencies.

12 REFERENCES

Requirements for the WSSRAP QA Program.

ANL, see Argonne National Laboratory

ANSI, see American National Standards Institute

Argonne National Laboratory, 1988. *Work Plan for the Remedial Investigation/Feasibility Study-Environmental Impact Statement for the Weldon Spring Site, Weldon Spring, Missouri*. DOE/OR/21548-033. Prepared for the U.S. Department of Energy, Oak Ridge Operations Office. St. Charles, Missouri. August.

Code of Federal Regulations 40 CFR Ch. 1, Part 300 - *National Oil and Hazardous Substances Contingency Plan.*

Effectuates the response powers and responsibilities created by CERCLA and Section 3.11 of the Clean Water Act, as amended.

EPA, see U.S. Environmental Protection Agency.

MKF and JEG, see MK-Ferguson Company and Jacobs Engineering Group

MK-Ferguson Company and Jacobs Engineering Group, 1992a. *Environmental Data Administration Plan.* Rev. 1. DOE/OR/21548-119. Prepared for the U.S. Department of Energy, Oak Ridge Operations Office. St. Charles, Missouri. February.

MK-Ferguson Company and Jacobs Engineering Group, 1992b. *Site Consolidated Transportation Activity Manual*, Rev. 0. DOE/OR/21548-309. Prepared for the U.S. Department of Energy, Oak Ridge Operations Office, Weldon Spring Site Remedial Action Project. St. Charles, MO. October.

MK-Ferguson Company and Jacobs Engineering Group, 1992c. *Project Management Contractor Quality Assurance Program*, Rev. 0. DOE/OR/21548-333. Prepared for the U.S.

Department of Energy, Oak Ridge Field Office, Weldon Spring Site Remedial Action Project. St. Charles, MO. September.

Defines the overall Quality Assurance Program to be followed for the Weldon Spring Site Remedial Action Project in accordance with applicable DOE Orders and ANSI/ASME NQA-1-1986.

U.S. Environmental Protection Agency, 1983. *Interim Guidelines and Specifications for Preparing Quality Assurance Project Plans.* QAMS - 005/80; EPA-600/4-83-004. Office of Monitoring Systems and Quality Assurance, Office of Research and Development, February.

Describes 16 elements that must be included in all QA project plans.

Data acceptance and evaluation criteria.

U. S. Environmental Protection Agency, 1986b. Office of Emergency and Remedial Response, *Users Guide to the Contract Laboratory Program*, Washington, D.C. December.

Outlines the requirements and analytical procedures of the new CLP protocols.

U. S. Environmental Protection Agency, 1987. *Data Quality Objectives for Remedial Response Activities*. EPA 540/G-87/003. Office of Emergency and Remedial Response and Office of Waste Programs Enforcement, March.

Guidance on development of DQOs for site-specific activities.